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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/748,466

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Cheolsoo Park

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GROSSMAN & FLIGHT, LLC
20 N. WACKER DRIVE
SUITE 4220
CHICAGO, IL 60606

EXAMINER

CHEN, JACK S J

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 10/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/748,466	Applicant(s) PARK, CHEOLSOO	
	Examiner Jack Chen	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12/30/03</u> <u>3</u> <u>1</u> <u>04</u> | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

In response to the communication filed on December 30, 2003, claims 1-8 are active in this application.

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The information disclosure statement filed on March 1, 2004 has been considered.

Oath/Declaration

Oath/Declaration filed on December 30, 2003 has been considered.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
3. The disclosure is objected to because of the following informalities: page 2, paragraph 0002, line 1, the phrase "Figs. Figs." Should change to -Figs.--.

Appropriate correction is required.

The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Drawings

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the local channel ion implantation, the silicide for S/D and LDD implantation (Re claim 4) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-8 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Re claim 1 (same problems existed in the specification, i.e, the abstract section and page 2, paragraph 0003), line 5, the phrase “patterning the first oxide layer and pad nitride layer to form a *gate electrode*” is unclear since the oxide and nitride layers are not conductive. It appears that the phrase “patterning the first oxide layer and pad nitride layer to form a *gate electrode*” should change to --patterning the first oxide layer and pad nitride layer to form a *gate electrode opening*--.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 1, line 5, the term “patterning” should change to --patterning--.

Re claim 1, line 7, the phrase “forming a doped polysilicon sidewall on the pad nitride layer and the first oxide layer” is not supported by the specification, it appears that this phrase

Art Unit: 2813

should change to --forming a doped polysilicon sidewall on a sidewall of the pad nitride layer and the first oxide layer--.

Re claim 4, the phrase "wherein a ... only in case ... or a lightly doped drain ... before depositing the gate isolation layer" does not positively recite the processes.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chong et al., U.S./6,727,151 B2 in view of Nishida et al., U.S. Pub. No. 2003/0151098 A1.

Due to the 112 problems, as best can be understood by the examiner is as following :

Chong et al. Teach a method for forming a semiconductor device, which comprises forming an isolation region (STI, col. 2, lines 40-45) in a semiconductor substrate and sequentially depositing a pad oxide layer 12, a pad nitride layer 14 and a first oxide layer 16 on the substrate and the isolation region (fig. 1); patterning the first oxide layer and the pad nitride layer to form a gate electrode opening (fig. 2); depositing a doped polysilcon layer 20 (fig. 3); forming a doped polysilicon sidewall 22/26 on a sidewall of the pad nitride layer and the first oxide layer (figs. 4-6); etching the pad oxide layer (fig. 7); sequentially depositing and planarizing a gate isolation layer 34 and a metal layer 36 on the substrate to form the gate electrode (figs. 9-10); and forming a source and a drain, see figs. 1-12; cols. 1-8 for more details.

Art Unit: 2813

Re claim 2, Chong et al. shows wherein the isolation region is STI (col. 2, lines 40-45).

Re claim 3, Chong et al. shows wherein a thickness of the pad oxide layer is not less than 50 angstroms (i.e., 100 angstroms; see col. 2, lines 45-55).

Re claim 4, Chong et al. shows wherein a local channel ion implantation is performed only in a case a source and a drain region is salicidated or a LDD implantation is performed before depositing the gate isolation layer (in this case, layer 24/26 is used as LDD; ion implantation for threshold voltage control is considered as the local channel ion implantation; see col. 3 for more details).

Re claim 5, Chong et al. shows wherein the doped polysilicon sidewall is used to serve as the LDD implantation (see col. 3, line 1-15).

Re claim 8, Chong et al. inherently shows the thickness of the pad oxide layer under the doped polysilicon sidewall is controlled to be used to serve as the LDD implantation since the same processes are carried out.

Chong et al. disclosed above; however, Chong et al. is silent to using gate nitride and the metal layer as the gate electrode and further forming contacts to the gate, source and drain.

Nishida et al. teach a method for forming a semiconductor device, which includes the steps of sequentially depositing and planarizing a gate isolation layer DE, a gate nitride layer BM (Re claim 6, TiN) and a metal layer GE (Re claim 7, tungsten) on the substrate 1 to form the gate electrode (fig. 13, page 7, paragraphs 0110-0113); and forming a source and a drain, a gate plug, a source plug and drain plug (fig. 15), see figs. 1-17, page 1-8 for more details.

Therefore, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to use TiN and tungsten for the gate electrode

Art Unit: 2813

as taught by Nishida et al. in the method of Chong et al. in order to improve the adhesive strength of the metal gate and prevent the impurities (TiN acts as a barrier). And further forming the S/D and gate contacts (S/D and gate plugs) as taught by Nishida et al. in the method of Chong et al. in order to provide an operated device.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack Chen whose telephone number is (571)272-1689. The examiner can normally be reached on Monday-Friday (9:00am-6:30pm) alternate Monday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W Whitehead can be reached on (571)272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jack Chen
Primary Examiner
Art Unit 2813